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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,326	11/12/2003	Rao Annapragada	LAM-P-1031	2008
48008	7590	08/21/2007	EXAMINER	
VIRTUAL LEGAL, P.C. MICHAEL A. KERR P.O. BOX 22028 CARSON CITY, NV 89721			NGUYEN, THANH T	
			ART UNIT	PAPER NUMBER
			2813	
			MAIL DATE	DELIVERY MODE
			08/21/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/712,326

**Applicant(s)**

ANNAPRAGADA ET AL.

**Examiner**

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Request for Continued Examination***

The request filed on 7/28/07 for a Request for Continued Examination (RCE) under 37 CFR 1.114 is acceptable and an RCE has been established. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Chooi et al. (U.S. Patent No. 6,465,888) in view of Lin et al. (U.S. Patent No. 6,455,232), and further in view of Morrow et al. (U.S. Patent Publication No. 2002/0081854).

Referring to figures 2a-4f, Chooi et al. teaches a method of removing a photoresist layer (see col. 7, lines 59-60) from an integrated circuit (IC) structure with little or no etching of an exposed barrier layer comprising an integrated circuit (IC) structure having an etched dielectric layer with an exposed barrier layer, wherein the dielectric layer comprises silicon and oxygen

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(230, see col. 7, lines 47-54) and the barrier layer comprises silicon nitride or silicon carbide

(215, see col. 7, lines 20-33), the method comprising:

Firstly, etching the dielectric layer (230) using a first fluorine containing gas (see col. 8, lines 1-35) and exposing the barrier layer (215, see figure 2b);

Secondly, feeding an oxidizing gas mixture into a reactor wherein the oxidizing gas mixture comprising carbon monoxide (CO), emerging the oxidizing gas mixture having carbon monoxide (CO) to generating a plasma in the reactor (see col. 8, lines 17-33, noted that gas have to flow in the chamber and plasmanizing); and

Selectively removing the photoresist layer with little or no etching of the exposed barrier layer (see figure 2b, col. 8; lines 11-16), thereby minimizing the loss of the exposed barrier material during removing the photoresist layer. Noted that since removing the photoresist by ashing without removing anything inside of the opening would minimize the loss of the barrier material.

Regarding to claim 2, dielectric material is silicon dioxide (230, see col. 7, lines 47-54).

Regarding to claim 3, the first gas mixture further comprises oxygen (O<sub>2</sub>) (see col. 8, lines 17-33).

Regarding to claim 4, the first gas mixture further comprises nitrogen (N<sub>2</sub>) (see col. 8, lines 17-33).

Regarding to claims 5, 11, 15, the first gas mixture further comprise the gas mixture selected from the group consisting of oxygen, nitrogen, nitrogen/oxygen, nitrous oxide, ammonia, nitrogen/hydrogen, and water vapor (see col. 8, lines 17-33).

Regarding to claims 6, 12, 17, etched dielectric material is composed of a material selected from the group consisting of silicon dioxide, silicon oxide, organosilicate glass, and fluorinate silicate glass (see col. 7, lines 34-54).

Regarding to claims 7, 13, 18, cap layer located between the dielectric and the photoresist, the cap layer is composed of a material selected from the group consisting of silicon dioxide, silicon oxynitride, silicon carbide and silicon nitride (235, silicon nitride, see col. 7, lines 54-58).

Regarding to claims 8, 14, reactor used to remove the photoresist from the IC structure is also used to etch the dielectric (see col. 8, lines 1-16).

Regarding to claim 9, 21, a third layer that includes a conductive interconnect (210) that abuts the barrier layer (215) and the second dielectric material (220) adjacent the conductive interconnect, the barrier (215) between the etched first dielectric layer (230) and the third layer (210).

Regarding to claims 10, 16, 19, 21, the first dielectric layer (230) and the second dielectric layer (220) is comprised of materials that include silicon and oxygen (see col. 7, lines 34-54, noted that silicon oxide includes silicon and oxygen).

Chooi et al. teaches etching the photoresist film by using carbon monoxide gas (CO) (see col. 8, lines 17-33). However, the reference does not teach fluorine containing gas generates a fluorinated polymer, and removing the photoresist film from the surface of the structure by using mixture of carbon monoxide gas (CO), oxygen and nitrogen gas, wherein carbon monoxide gas reacts with the fluorinated polymer deposited on the IC.

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Lin et al. teach etching the oxide film by using fluorocarbon etch gas (fluorine-containing gas) generates a fluorine polymer (see col. 2, lines 25-36), removing the photoresist film from the surface of the structure by using carbon monoxide gas, wherein carbon monoxide gas reacts with the fluorinated polymer deposited on the IC (see figure 5-6, col. 2, lines 47-59, col. 5, lines 64-67, col. 4, lines 1-5, and claim 11).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would fluorine containing gas generates a fluorinated polymer, and removing the photoresist film from the surface of the structure by using carbon monoxide gas, wherein carbon monoxide gas reacts with the fluorinated polymer deposited on the IC in process of Chooi et al. as taught by Lin et al. because removing the photoresist film by using mixture of carbon monoxide gas (CO) from the surface of the structure would prevent attack or damage to the bottom layer or the side wall of the structure as well as remove the polymer that attached on the IC during the previous etching process.

Morrow et al. teaches removing the photoresist film by using mixture of carbon monoxide gas (CO), oxygen and nitrogen gas from the surface of the structure (see figure 5e, paragraph# 54). Noted that the same gas would inherently provide the same function as minimizing the loss of the exposed barrier during the removal of the photoresist film.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would removing the photoresist film by using carbon monoxide gas (CO) from the surface of the structure in process of Chooi et al. as taught by Morrow et al. because removing the photoresist film by using mixture of carbon monoxide gas

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(CO), oxygen and nitrogen gas from the surface of the structure would prevent attack or damage to the bottom layer or the side wall of the structure.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pairdirect.uspto.gov>. Should you have questions on access to thy Private PAIR system, contact the Electronic Business center (EBC) at 866-217-9197 (toll-free).



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